Technical Report 1240

Assessment of the Captains in Command Training Program for Adaptive Thinking Skills

Scott B. Shadrick and Jeffrey E. Fite
 U. S. Army Research Institute

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14. ABSTRACT *(Maximum 200 words)*

Adaptive thinking is a key component of competency in battle command. Unfortunately, expertise in adaptive thinking is not easily acquired and training typically requires the presence of a live instructor. This report presents the first evaluations of Captains in Command, an instructorless program for training adaptive thinking skills in company-grade officers. Participants were 36 students enrolled in the Maneuver Captain's Career Course (MCCC) at Fort Knox, Kentucky. Students received instruction on adaptive thinking and themes of battlefield thinking. They then viewed a series of vignettes, which placed them in the role of a company commander faced with complex tactical problems. After each vignette, students were asked to identify the critical tactical information required before a sound decision could be made. Three-dimensional animated characters provided coaching and discussed the relevant information identified by expert tacticians. With Captains in Command training, students showed significant improvements in their ability to identify critical information. They were also able to identify significantly more information than untrained students regardless of prior deployment experience. When the efficacy of instructorless Captains in Command training was compared to instructor-facilitated Think Like a Commander (TLAC) training, there were no significant differences in students' performance at the end of the program.

15. SUBJECT TERMS

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ACKNOWLEDGMENTS

ASSESSMENT OF THE CAPTAINS IN COMMAND TRAINING PROGRAM FOR ADAPTIVE THINKING SKILLS

EXECUTIVE SUMMARY

Research Requirement:

The research addressed in this report focuses on the need for an instructorless training program for adaptive thinking skills and the requirement to assess that program. Adaptive leaders are critical to the Army's success in fluid and ambiguous contemporary operational environments such as postwar Iraq. However, previous training on adaptive thinking skills with programs such as Think Like a Commander (TLAC) has required the presence of a live instructor—a requirement that cannot always be met. This report documents the results of work by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) to train adaptive thinking behaviors in company-grade officers using a PC-based, instructorless training program, Captains in Command, and to assess the effectiveness of the training.

Procedure:

The Maneuver Captain's Career Course (MCCC) at Fort Knox, KY, is responsible for training and developing adaptive, self-confident combined arms leaders to perform battle command tasks in a full spectrum environment. As part of their MCCC training, students received training on adaptive thinking skills using the Captains in Command program. Students received instruction on adaptive thinking skills and eight themes of battlefield thinking, a mental framework useful for understanding what it means to think adaptively. They then viewed a series of multimedia tactical vignettes, which placed them in the role of a company commander faced with complex and rapidly changing tactical situations. At the end of each vignette, students were required to identify the critical tactical information required before a sound tactical decision could be made. Within the context of each vignette, three-dimensional animated characters then provided extensive coaching to the students along with the critical tactical information identified by expert tacticians—tasks once performed only by live instructors. Once the expert critical tactical information was presented, the Captains in Command system helped students to evaluate their own performance. It then provided feedback and automatically recorded the students' input and self-scores.

Findings:

Students showed significant improvements in their ability to identify critical tactical information. In fact, Captains in Command-trained students were able to identify significantly more critical tactical information than did untrained students with and without prior deployment experience. Evaluations of Captains in Command efficacy, content, and usability were generally positive and, when the efficacy of instructorless Captains in Command training was compared to instructor-facilitated TLAC training, there were no significant differences in performance gains.

Utilization and Dissemination of Findings:

The results of the research presented here have been used to advance the development of adaptive thinking training throughout the Army. On 24 July 2007, General William S. Wallace, Commanding General, U.S.

Army Training and Doctrine Command was provided with a briefing and demonstration of the Captains in Command training program. General Wallace requested an assessment of the program's utility and effectiveness. The initial results of this analysis were provided to General Wallace in February, 2008. As a result, the Captains in Command training was distributed to all TRADOC Captains Career Courses for consideration. The subsequent review resulted in two-day workshop on 21-22 October 2008 to support transition of the training to TRADOC and development of branch training using the Captains in Command method. The Center for Army Leadership of the Combined Arms Command became the proponent for Captains in Command and is currently implementing it as part of the Captains Career Course Common Core.

ASSESSMENT OF THE CAPTAINS IN COMMAND TRAINING PROGRAM FOR
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"...there is no substitute for flexible, adaptable leaders. The key to many of our successes in Iraq, in fact, has been leaders–especially young leaders–who have risen to the occasion and taken on tasks for which they'd had little or no training, and who have demonstrated enormous initiative, innovativeness, determination, and courage. Such leaders have repeatedly been the essential ingredient in many of the achievements in Iraq. And fostering the development of others like them clearly is critical to the further development of our Army and our military."
- General David Petraeus, Commanding General, Multi-National Force-Iraq (2006)

Introduction

Adaptive thinking, or the ability to make adjustments to an unfolding plan under the dynamic conditions of military operations (Shadrick, Lussier, & Fultz, 2007), is a key component of competency in battle command. Leaders who are skilled in adaptive thinking respond rapidly and intelligently to unexpected actions and events and are capable of exploiting them and/or minimizing their harm (Wong, 2004). Given the fluid and often ambiguous contemporary operational environments of Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and postwar Iraq, it is not difficult to understand why the development of adaptively thinking leaders has been a central focus of U.S. Army transformation (Shinseki, 1999) and recent annual Army Posture Statements (Brownlee & Schoomaker, 2004; Geren & Casey, 2008; Harvey & Schoomaker, 2005, 2006, 2007; Shinseki & White, 2003).

Unfortunately, expertise in adaptive thinking is not easily acquired. Research on the development of expertise suggests that experience alone, be it in real or "fully realistic" simulated battles, is probably not the most effective method of developing expertise (Ericsson, 2007). It is, however, the most common method of training battle command in today's Army. Nonetheless, current research on the development of expertise indicates that expertise is more likely to be attained through deliberate practice (Ericsson, 2007)—that is, practice that is characterized by repetition, conscious focus, work versus play, stops and starts, active coaching, focused feedback, immediacy of performance, and emphasis on difficult aspects and areas of weakness (see Table 1).

Answering the Army's need for a more effective approach to adaptive thinking training for its junior leaders, the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) developed the Think Like a Commander (TLAC) training program (Shadrick & Lussier, 2002; Lussier, Shadrick, & Prevou, 2003). Utilizing the principles of deliberate practice, TLAC is a PC-based, instructor-facilitated program that teaches company-grade officers to think adaptively, by training them to rapidly and thoroughly analyze tactical situations even when conditions deviate from what is expected. To assist the learning process, students are also taught eight themes of battlefield thinking (see Table 2), which are thought to be common to the mental models of expert tactical thinkers (Lussier, 1998; Lussier, Ross, & Mayes, 2000; Ross & Lussier, 2000).

Table 1

Characteristics of Deliberate Practice

Characteristic	Description
Repetition	Practice occurs repetitively, rather than at a naturally occurring frequency.
Conscious focus	Student consciously attends to the specific elements of the task.
Work versus play	Practice feels more like work than play and is more effortful than casual performance.
Stops and starts	Because of the repetition and feedback, deliberate practice is typically seen as a series of short performances rather than continuous training.
Active coaching	A coach monitors performance, assessing adequacy, and controlling the structure of training.
Focused feedback	Task performance is evaluated by the coach or learner.
Immediacy of performance	After corrective feedback, there is immediate repetition of task.
Emphasis on difficult aspects	Practice focuses on the more difficult aspects of a task.
Emphasis on areas of weakness	Practice is tailored to areas of weakness.

Note. Table adapted from Shadrick and Lussier (2004).

Because it is instructor facilitated, TLAC training most commonly occurs in a classroom setting (i.e., face-to-face) or via synchronous distance learning. After receiving preliminary training on adaptive thinking and the eight themes of battlefield thinking (see Figure 1A), students view a 3-5 min audio-video vignette (e.g., Trouble in McLouth, Save the Shrine, The Recon Fight, Before the Attack), which places them in the role of a company commander faced with complex and rapidly changing tactical problems (see Figure 1B). Because the goal of TLAC is to teach officers "how to think" and not "what to think," students are not explicitly asked to solve the problem presented in the vignette. Rather, they are given a specified amount of time to enter the critical tactical information that they believe should be taken into account before a tactical decision is made (see Figure 1C). A panel of expert battlefield commanders provided a unique set of approximately 16 pieces of critical tactical information for each vignette (Shadrick & Lussier, 2004) and those expert-provided answers form the basis of student performance evaluations. Once the allotted amount of time has elapsed, an instructor leads a group discussion on the problem presented in the vignette, the critical tactical information as identified by expert tacticians, and the critical tactical information identified by the students (see Figure 1D). Next, the TLAC system assists the student in evaluating his or her performance and provides additional feedback related to the themes of battlefield thinking (see Figure 1E). Training then continues across each of (up to) eight vignettes, with the amount of time to consider each scenario decreasing from 15 min for the first vignette to only 3 min for the final vignette. For a more extensive description of the TLAC methodology and training process, see the *Think Like a Commander prototype: Instructor's guide to adaptive thinking* (Lussier et al., 2003).

Table 2

TLAC Themes of Battlefield Thinking

Theme	Description
Keep a Focus on the Mission and Higher's Intent	Commanders must never lose sight of the purpose and results they are directed to achieve.
Model a Thinking Enemy	Commanders must not forget that adversaries are reasoning human beings intent on defeating them.
Consider Effects of Terrain	Commanders must not lose sight of the operational effects of the terrain on which they must fight.
Use All Assets Available	Commanders must not lose sight of the synergistic effects of fighting their command as a combined arms team.
Consider Timing	Commanders must not lose sight of the time they have available to get things done.
See the Big Picture	Commanders must remain aware of what is happening around them, how it might affect their operations, and how they can affect others' operations.
Visualize the Battlefield	Commanders must be able to visualize a fluid and dynamic battlefield with some accuracy and use the visualization to their advantage.
Consider Contingencies and Remain Flexible	Flexible plans and well thought out contingencies result in rapid, effective responses under fire.

Note. Table adapted from Shadrick, Lussier, & Fultz (2007).

Thus far, there is good reason to believe that TLAC is an effective method of training adaptive thinking skills. Students trained on multiple TLAC vignettes show significant improvement in their ability to identify critical tactical information, despite having less and less time to consider each scenario (Figure 2; Shadrick & Lussier, 2004). The TLAC vignettes appear to tap into and require adaptive thinking skills which are normally strengthened through experience. For example, the ability to identify critical tactical information is rank (i.e., experience) related (Figure 3; Shadrick et al., 2007). Captains perform better than lieutenants, majors better than captains, and lieutenant colonels better than majors. Moreover, students (captains and majors) with OIF or OEF deployment experience identify significantly more critical tactical information than those without OIF/OEF deployment experience (Figure 3; Shadrick et al., 2007). It also appears that TLAC training can result in measurable improvements in adaptive thinking skills, above and beyond what is normally gained through experience. Students who have completed TLAC training identify more critical tactical information than do students without TLAC training, including those with OIF/OEF deployment experience (Figure 4; Shadrick et al., 2007). What's more, a recent report by Shadrick, Crabb, Lussier, and Burke (2007) demonstrated that the skills gained from TLAC training also transfers to other tasks.
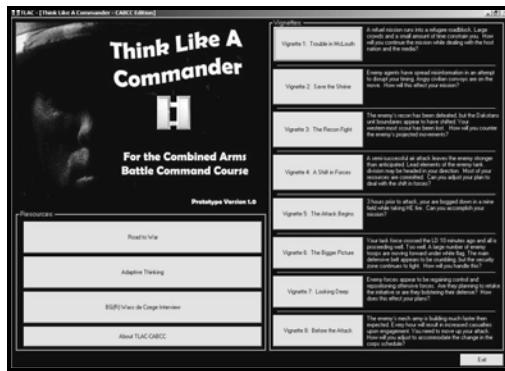
A) Students receive text-based training on adaptive thinking skills and the eight themes of battlefield thinking.

B) They then view a 3-5 min audio-video vignette that presents a complex and rapidly changing tactical problem.

C) Students are given 15 min to identify all of the critical tactical information that should to be taken into account before a tactical decision is made.
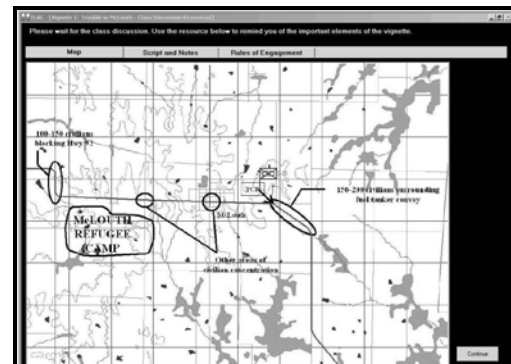
D) An instructor then leads group discussion on the vignette, the critical information identified by experts, and the critical information identified by students.

E) The TLAC system also evaluates student performance and provides feedback related to the themes of battlefield thinking. Training then continues across each of (up to) eight vignettes, with students allowed less and less time to consider subsequent vignettes.

Figure 1. Overview of the TLAC training process.
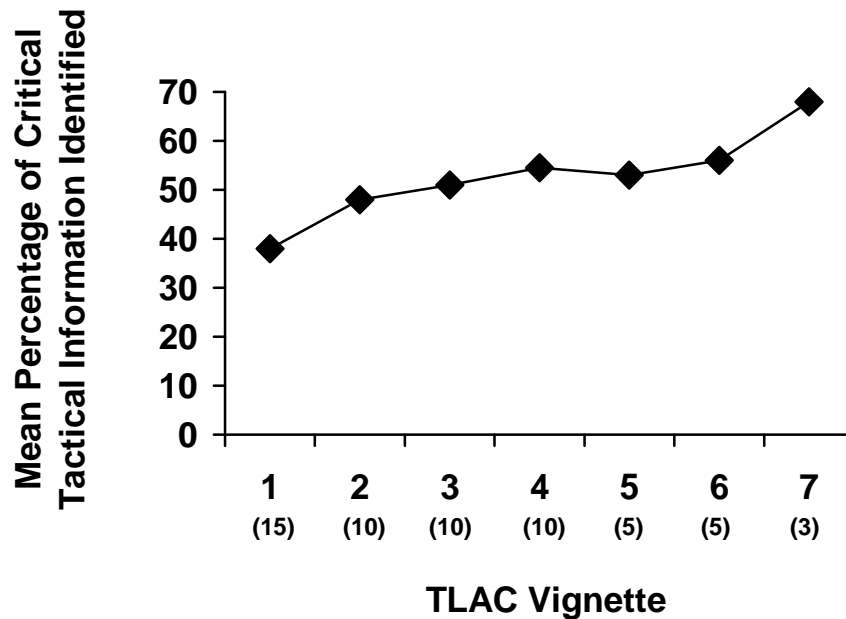
Figure 2. Mean percentage of critical tactical information identified by students ($N =$ 24) across seven TLAC vignettes. Values in parentheses indicate the amount of time (min) that students were allowed to consider each vignette. Figure adapted from Shadrick and Lussier (2004). Global F test, $p < .01$
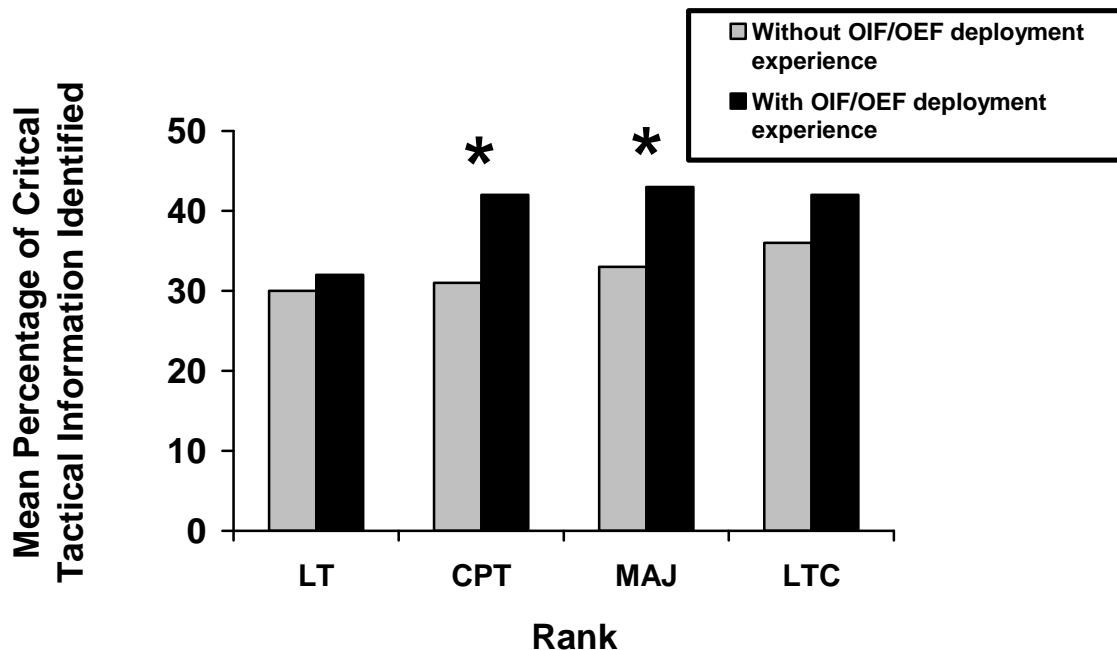
Figure 3. Mean percentage of critical tactical information identified in a subset of three TLAC vignettes by students ($N = 143$) with and without OIF/OEF deployment experience. Figure adapted from Shadrick et al. (2007). LT = lieutenants ($N = 38$); CPT = captains ($N = 45$); MAJ = majors ($N = 34$); LTC = lieutenant colonels ($N = 26$).
$* p < .01$

Average score of CPTs with OIF/OEF experience, but no TLAC training on three TLAC vignettes

Performance of Captains using TLAC

Average score of CPTs with neither TLAC training nor OIF/OEF experience

Mean Percentage of Critical Tactical Information Identified

70 60 50 40 30 20 10 0

1 2 3 4 5 6 7
(15) (10) (10) (10) (5) (5) (3)
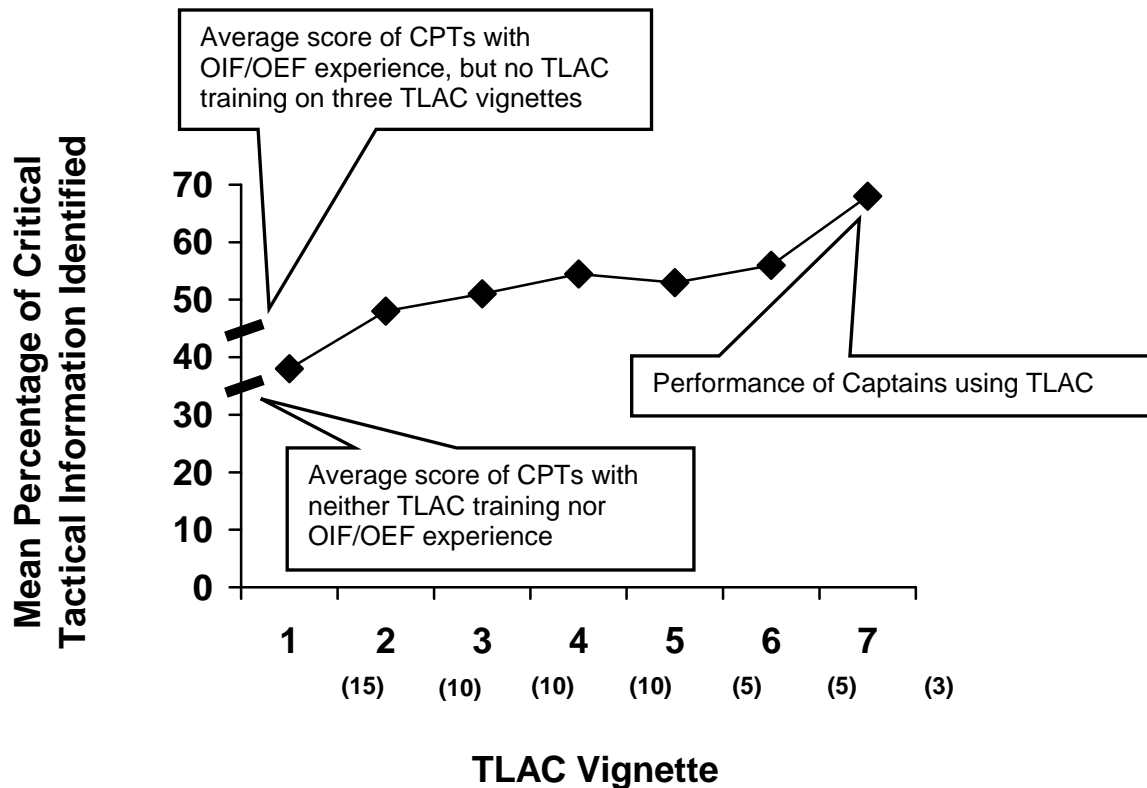
TLAC Vignette

Figure 4. Mean percentage of critical tactical information identified by students ($N = 24$) across seven TLAC vignettes, as compared to the performance of students ($n = 45$) with and without OIF/OEF deployment experience on a subset of three vignettes. Values in parentheses indicate the amount of time (min) that students were allowed to consider each vignette. Figure adapted from Shadrick et al. (2007).
* $p < .01$

Specifically, students who have completed TLAC training produce better company-level Operations Orders (OPORD) than do students without TLAC training. Taken together, those studies suggest that TLAC training does result in performance improvements. They also suggest that the skill that is being learned is, in fact, adaptive thinking.

Think Like a Commander is currently being used in the Maneuver Captain's Career Course (MCCC) at Fort Knox (Shadrick et al., 2007). It is also being used in the MCCC-Reserve Component (MCCC-RC) at Fort Knox. Additionally, it has been either used or demonstrated at Fort Benning, Fort Bragg, Fort Carson, Fort Drum, Fort Eustis, Fort Huachuca, Fort Leavenworth, Fort Lee, Fort Leonard Wood, Fort Sill, and the Joint Forces Headquarters of the Indiana National Guard.

Despite its success, TLAC does have drawbacks. Namely, the program requires a knowledgeable instructor to facilitate discussion and provide students with feedback. And, as the number of students increase, so does the number of instructors required. The number of instructors is also increased when students are geographically dispersed. For those reasons, ARI set out to develop a version of TLAC that did not require the presence or participation of an

instructor. The result of this effort was Captains in Command. Released in 2006, Captains in Command is an instructorless training program for adaptive thinking skills. At this time, there are two versions available–Captains in Command: Captain's Edition, which contains the original eight TLAC vignettes but with three-dimensional, animated coaches, and Captains in Command: Mission to Azerbaijan, which contains 10 all-new vignettes.

Captains in Command makes use of the same deliberate training concepts as TLAC. After receiving animation- and video-based training on adaptive thinking skills (Figure 5A), students view a 3-5 min vignette (Figure 5B), which once again places them in the role of a company commander faced with challenging and quickly evolving tactical problems. They are then asked to enter the critical tactical information that they believe should be taken into account before a sound tactical decision is made (Figure 5C). Unlike TLAC, there are no time constraints in Captains in Command training. Within the context of the vignette, three-dimensional, animated coaches then discuss with one another the tactical problem presented in the vignette and the critical information identified by experts (Figure 5D). This animated coaching is extensive and may last up to 20-30 min per vignette. Once the critical tactical information has been identified, the Captains in Command system helps students to evaluate their own performance by asking them to click on the expert-identified critical tactical information that appeared in their own lists (Figure 5E). The Captains in Command system then provides feedback to students, based on the number of expert-identified items that students also noted (Figure 5F). At that time, training continues across additional vignettes.

Here we present the first evaluations of Captains in Command. The purposes of our study were fourfold. First, we wanted to know if students trained on Captains in Command would show significant improvements in the ability to think adaptively. To answer this question, we looked for changes in the ability of students to identify critical tactical information as they progressed through seven training vignettes of Captains in Command. Second, we wanted to ensure that the replacement of TLAC's live instructors with three-dimensional, animated coaches did not represent a significant loss of training efficacy. Therefore, we compared the ability of Captains in Command-trained students to identify critical tactical information on their last training vignette to the ability of TLAC-trained students to identify critical tactical information on their last vignette. Third, because adaptive thinking skills are known to develop and strengthen with OIF/OEF deployment experience (Wong, 2004), we wanted to compare the adaptive thinking skills of Captains in Command-trained students to the adaptive thinking skills of untrained students with and without prior deployment experience. To do so, we compared the ability of Captains in Command-trained students to identify critical tactical information to the ability of untrained students with and without prior deployment experience to do the same on a subset of three vignettes. Fourth, we wanted to gather the feedback and opinions of students regarding Captains in Command efficacy, content, and usability. Here we reviewed the written evaluations of MCCC students.

Method

Participants

Participants were 35 Army captains and one lieutenant who were enrolled in MCCC at Fort Knox, KY, during the 2006-2007 academic year. The first and second small groups resulted in 13 participants each. The remaining 10 participants came from the third small group. A majority of the participants were from Armor ($n = 23$) and Infantry ($n = 7$). Two-thirds of the participants ($n = 24$) had at least one deployment, while only four participants had multiple deployments to Iraq or Afghanistan.

Design and Procedure

Before the MCCC began, the Captains in Command program was installed on each student's laptop computer. Students received a short presentation on the importance of adaptive thinking in the contemporary operational environment. They were also instructed to review a short instructional video that provided detailed information on the eight themes of battlefield thinking and adaptive thinking performance. Those materials are all part of the Captains in Command training product. After completing that initial training, students were asked to complete seven Captains in Command vignettes.

During scheduled class times or during assigned homework activities, students would complete one vignette at a time. When the training occurred during class time, they wore headphones and participated in the training individually. Neither group nor team efforts were allowed.

For each of the seven vignettes, Captains in Command prompted students to enter the critical tactical information that they believed should be taken into account before a tactical decision is made. Three-dimensional, animated coaches then spent 20-30 min discussing with one another the tactical problem presented in the vignette and the critical information identified by expert tacticians. The Captains in Command system helped students to evaluate their own performance by asking them to click on the expert-identified critical tactical information that appeared in their own lists. The Captains in Command system then provided feedback, based on the number of expert-identified items that students noted. The total training time was approximately 7 hr per student.

After a vignette was completed, the Captains in Command program saved students' input as a Microsoft Word document (.doc) file onto the hard drive of the laptop on which it was running. The program also saved the results of their self-assessments. These files were then printed for analysis at a later date. In addition to the automated performance measures, students from two small groups ($n = 12$) were also asked to complete a short survey regarding the efficacy, content, and usability of the Captains in Command. All questions used a five point scale (5 = Strongly Agree, 4 = Slightly Agree, 3 = Unsure, 2 = Slightly Disagree, and 1 = Strongly Disagree). The post-training survey can be found in Appendix A.

A) Students receive text- and animation-based training on adaptive thinking skills and eight themes of battlefield thinking.

B) They then view a 3-5 min animated vignette that presents a complex and rapidly changing tactical problem.
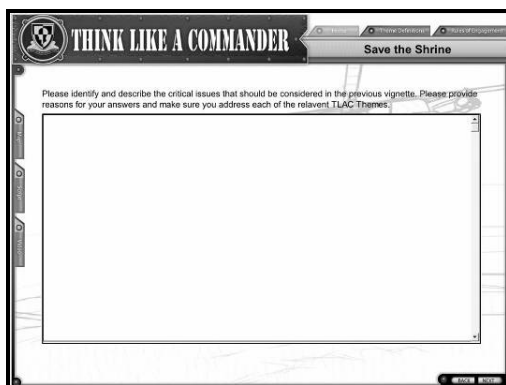
C) Students are asked to identify all of the critical tactical information that should to be taken into account before a tactical decision is made.

D) Three-dimensional, animated coaches discuss the tactical problem presented in the vignette and the critical information identified by experts.
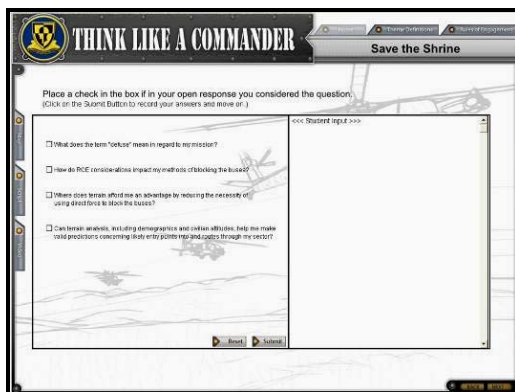
E) The Captains in Command system helps students to evaluate their own performance by asking them to identify items of expert-identified critical information that were also on their own lists.
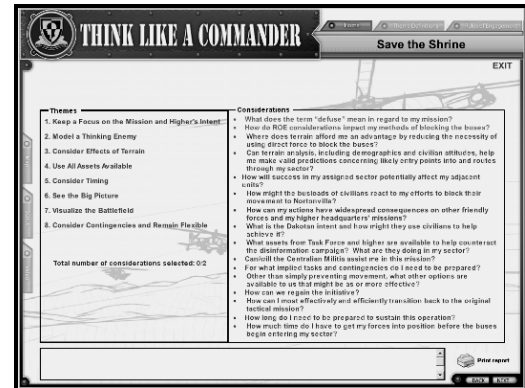
F) The Captains in Command system then provides feedback to students. Training then continues across other vignettes.

Figure 5. Overview of Captains In Command instructorless training process.

Archival data

Data from TLAC training. Due to a time-limited directive to compare the performance of Captains in Command-trained students to the performance of TLAC-trained students, we utilized previously published (Shadrick & Lussier, 2004) archival data from an earlier TLAC study. Data were collected from 24 students enrolled in the Armor Captain's Career Course at Fort Knox, KY. Students were assigned to one of two small groups at the onset of the course, and each small group was led by an instructor.

Each instructor received a 6 hr block of training on using the TLAC materials and program of instruction. A senior instructor from the School for Command Preparation at Fort Leavenworth, KS, and the developers of TLAC, provided that training. The training session included discussions about adaptive thinking and adaptive performance, detailed information on how to use the TLAC materials, and techniques for facilitating discussion with students. Instructors also received lesson plans that included specific information on each vignette and identified the key training objectives.

The TLAC program was installed on every student's laptop computer and on classroom workstations. Instructors presented seven audio-video vignettes to their class using a Proxima display unit. After viewing each vignette, students were asked to individually list all of the critical tactical information from the vignette by typing these items, in bullet form, into their computers. As a part of the training, instructors decreased the amount of time students were allowed to generate their lists for each vignette (Table 3). Instructors then led a discussion of the vignette to highlight the relevant teaching points. Finally, students were required to compare the lists of critical tactical information that they generated with a list generated by a panel of expert tacticians and to score themselves. They then received feedback on their performance based on the Think Like a Commander themes of battlefield thinking. The critical tactical information correctly identified by each student, as well as the actual student input, was recorded. Since every vignette did not have the same number of critical indicators, the data were converted to percentages for analysis. For additional details on these data, their collection, and analyses see *Assessment of the Think Like a Commander training program* by Shadrick and Lussier (2004).

Table 3

Amount of Time (min) that TLAC Students Were Given to Identify Critical Tactical Information

Vignette	Time (min)
1	15
2	10
3	10
4	10
5	5
6	5
7	3

Data based on prior deployment experience. Data from captains with and without prior deployment experience were also collected as part of a previously published study (Shadrick et al., 2007). Data were collected from 45 captains at Fort Benning, GA, Fort Bliss, TX, Fort Campbell, KY, Fort Carson, CO, Fort Drum, NY, Fort Huachuca, AZ, Fort Knox, KY, Fort Lee, VA, and Fort Leonard Wood, MO.

A subset of three tactical vignettes was administered to groups of four to eight students during 2 hr sessions. After the vignette was presented, students were asked to individually list all of the critical tactical information from the vignette. Students received no training on how to respond to the vignettes, other than being asked to identify and record the critical tactical features of the situations that they were shown. There was no discussion of adaptive thinking or the eight themes of battlefield thinking. Students were provided 10 min to respond to each vignette, and they responded by writing their comments on a blank sheet of paper. Response forms were collected at the end of each vignette. For additional details on these data, their collection, and analyses see Shadrick, Lussier, and Fultz (2007).

Analyses

To assess changes in the ability of Captains in Command-trained students to identify critical tactical information as they progressed through the seven training vignettes, we conducted a one-way repeated measure Analysis of Variance (ANOVA) on the percentage of critical information that was identified. To compare the ability of Captains in Command-trained students to identify critical tactical information to the ability of TLAC-trained students to identify critical tactical information in the same vignettes, we conducted a one-sample t test. To compare the ability of Captains in Command-trained students to identify critical tactical information to the ability of students, with and without deployment experience, to identify critical tactical information, we also conducted a one-sample t test. An α level of .05 was adopted for all statistical tests.

Results

Captains in Command Training and the Ability to Identify Critical Tactical Information

The ability of Captains in Command-trained students to identify critical tactical information varied as a function of their training. Table 4 presents the number of students that completed each vignette (i.e., all students did not complete all seven vignettes due to time constraints) and the descriptive statistics for the percentage of critical tactical information identified. Mauchly's Test of Sphericity was used to test whether the variance-covariance matrix structure was orthonormal. The results, Mauchly's $W(20) = .125$, $p > .05$, indicated that the assumption was satisfied. Overall, students showed significant improvements in their ability to identify critical tactical information, $F(6, 102) = 7.165$, $p < .01$. As illustrated in Figure 6, students were only able to identify 37.5% of the critical tactical information in Vignette 1. However, by Vignette 7, they were able to identify 58.0% of the critical information. The results of within-subjects contrasts, $F(1, 17) = 21.057$, $p < .01$, confirmed a significant linear trend in their ability to identify critical information across the seven vignettes.

There was a noticeable "dip" in students' performance on Vignettes 3 and 4. For many students, Vignette 4 was completed after a block leave period associated with the Christmas holiday. It may be that the extended break away from training could have attenuated their performance due to forgetting.

Table 4

Number of Captains in Command Students Completing Each Vignette, and Descriptive Statistics for the Percent of Critical Tactical Information Identified

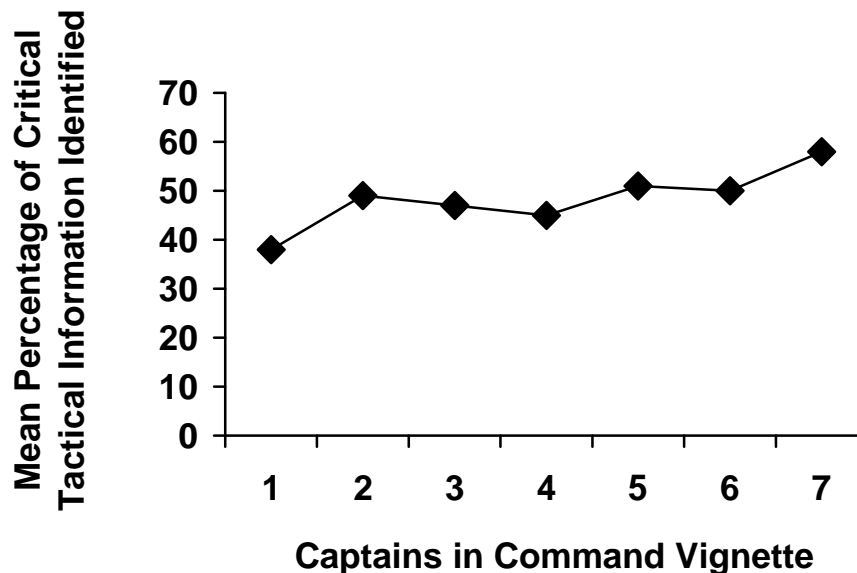| Vignette	n	M	SD
1	31	.375	.16
2	29	.485	.16
3	31	.474	.13
4	28	.446	.13
5	26	.512	.10
6	21	.497	.15
7	21	.580	.13

Figure 6. Mean percentage of critical tactical information identified by students ($N = 36$) across seven Captains in Command vignettes. Global F test, $p < .01$

Captains in Command Training Versus TLAC Training

The replacement of TLAC's live instructors with Captains in Command's three-dimensional, animated coaches did not appear to impact the efficacy of the training. Figure 7 shows the performance of both groups across seven training vignettes. At Vignette 7, there was no statistical difference in the ability of TLAC-trained (67.0%) and Captains in Command-trained (58.0%) students to identify critical tactical information, t (21) = -1.782, p = .089.

Captains in Command Training Versus Deployment Experience

The ability of Captains in Command-trained students to identify critical tactical information differed from the ability of untrained students with and without prior deployment experience. The performance of all groups is shown in Figure 8. By Vignette 7, Captains in Command-trained students were able to identify significantly more critical tactical information (58.0%) than did untrained students with (42.0%) and without (32.0%) prior deployment experience on our subset of three vignettes, $t(20) = 5.868$, $p < .01$ and $t(20) = 9.528$, $p < .01$, respectively.

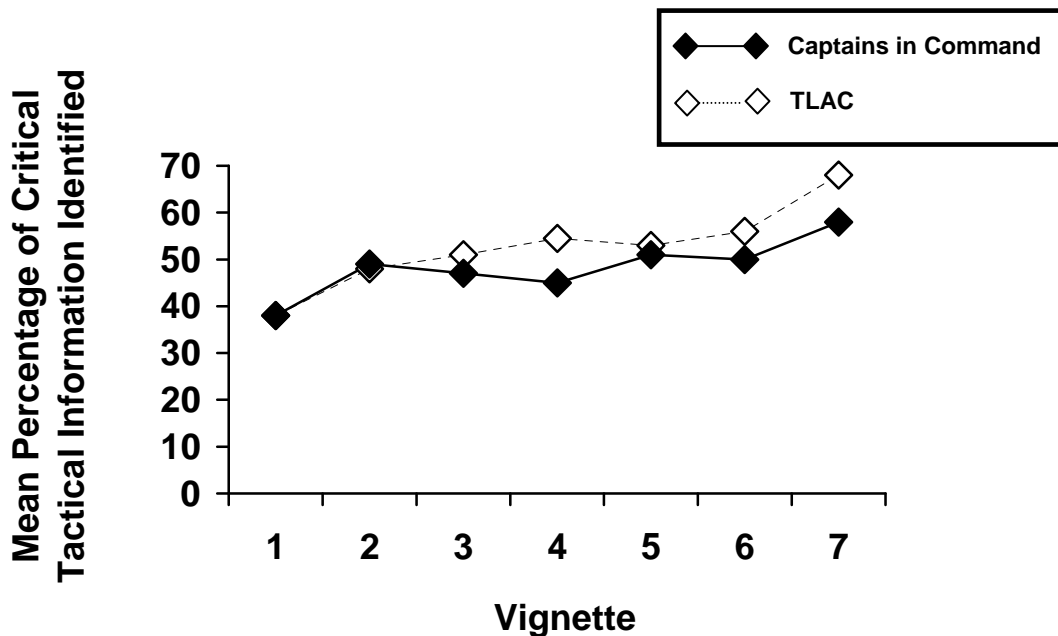Figure 7. Mean percentage of critical tactical information identified by students across seven Captains in Command ($N = 36$) and TLAC ($N = 24$) vignettes. Data on TLAC performance from Shadrick & Lussier (2004).
* $p < .01$

Feedback from Students

Overall, the feedback from students regarding the efficacy and content of Captains in Command was very positive (Table 5). Students thought the training was effective and made

them think, were interested in completing additional vignettes focused on other operational environments, thought the training would be effective outside the course, and thought that the training would help them to be a better commander. They also felt that the training was easy to navigate, provided understandable tactical situations, effective coaching animations to reinforce training themes, and effective performance assessment. However, they were unsure if the training helped them with other portions of the course and were unsure how proficient they were in the use of the themes. Students also responded positively to questions about the usability of Captains in Command (Table 6). Overall, students thought that the program was easy to navigate, provided appropriate tactical situations, effective coaching, and effective performance assessment.
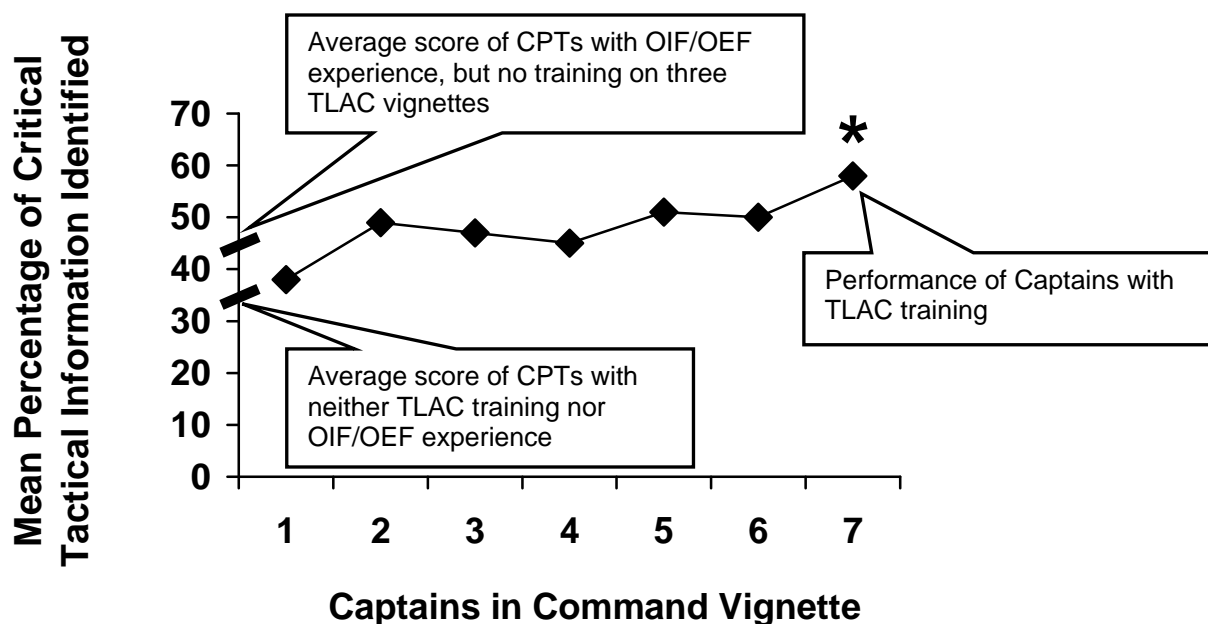
Figure 8. Mean percentage of critical tactical information identified by students ($N = 36$) across seven Captains in Command vignettes, as compared to the performance of students ($n = 45$) with and without OIF/OEF deployment experience on a subset of three vignettes. Deployment experience data from Shadrick et al. (2007).
* $p < .01$

The results of our post-training survey were reinforced by responses to two open-ended questions. First, students were asked to describe the best or most effective parts of the Captains in Command training. Some of the responses to this item were as follows:

- The fact that the scenarios had incomplete information and still required analysis beyond the simple solution.

- It makes you think on certain subjects and those lead to a solution to a tactical problem.

- The most effective part was the theme identification and application to each scenario.

- The use of the simulated human interaction.

Table 5

Mean Scores on Survey Items Relating to the Efficacy and Content of Captains in Command

Survey Items	*M*
1. Overall, Captains in Command training is effective—it made me think.	4.50
2. I would recommend Captains in Command to others.	4.17
3. I feel proficient in the use of the themes.	3.67
4. Captains in Command would help my professional development.	4.17
5. Captains in Command would help me be a better commander.	4.08
6. Captains in Command was an engaging, interesting activity.	4.00
7. Captains in Command helped me with other portions of the course.	3.33
8. Captains in Command is an efficient way to provide instructorless coaching when live mentors are not available.	3.50
9. I would be interested in doing more vignettes (focused on other operational environments).	4.42
10. Captains in Command would be effective training outside of a course (e.g., self-development).	4.42

Note. All survey items were based on a 5-point Likert scale with 5 = "strongly agree" and 1 = "strongly disagree."

Table 6

Mean Scores on Survey Items Relating to the Usability of Captains in Command

Survey Items	*M*
1. It was easy to navigate through the Captains in Command program.	4.67
2. The tactical situation video clips provided an easily understandable tactical situation.	4.33
3. The animated coaching video clips effectively reinforced the Captains in Command themes.	4.08
4. The performance assessment checklist effectively supported adaptive thinking training.	4.08

Note. All survey items were based on a 5-point Likert scale with 5 = "strongly agree" and 1 = "strongly disagree."

- Provided different ways of doing things and different solutions I had not thought of. The After Action Reviews (AAR) were good.

- It provides you with what right looks like. You are able to hear things that sometimes you would not think about during an operation.

- It forces you to make that decision.

- It is very thorough and seems to be accurate in so far as what a commander should do in a given situation.

- The think that I learned the most about was remembering to focus on higher mission and intent. This is something that you don't do as much while you are a platoon leader because most of your actions are directed.

- Realistic scenarios.

- Makes you think and then shows you stuff you did not think of.

Second, students were asked to describe the parts of Captains in Command training that needed the most improvement. Students noted that the AARs would be more effective if they included video clips, maps, or sketches to highlight the themes being discussed in the context of the vignettes. This point was reiterated by one student that commented that listening to the animated company commanders discuss the vignette is "lengthy and at times tedious." He then suggested that those discussions be broken up with animation showing each theme. Several students suggested that more explanation of the themes and thought patterns of the commander be included.

Discussion and Recommendations

With Captains in Command training, students showed significant improvements in their ability to identify critical tactical information. In fact, students were able to identify significantly more critical tactical information than did untrained students with and without prior deployment experience. Evaluations of Captains in Command efficacy, content, and usability were positive and, when the efficacy of instructorless Captains in Command training was compared to instructor-facilitated TLAC training, there were no significant differences in students' performance at the end of the training program.

Shadrick and Lussier (2004) showed that use of the TLAC training program produced increases in performance. An examination of student self-scores revealed significant performance gains in a key component of adaptive thinking–the rapid analysis of battlefield situations to identify key considerations for decision-making. Student scores were verified by an independent rater to insure scores were not systematically inflated. The performance gains were found even though time constraints were made increasingly more stringent. Both students and instructors perceived the training as valuable.

A key aspect of TLAC training was the coaching a live instructor provided to the students with regard to expert adaptive thinking habits. Instructors encouraged and required students to discuss and defend their considerations relevant to the vignette. The instructors also discussed the second- and third-order effects related to the actions the student suggested. The instructor, or coach, facilitated the discussion and actively monitored performance, assessing adequacy, controlling the structure of the training, and modeling student behavior on the expert behaviors.

One drawback of TLAC training, however, is that it requires a knowledgeable instructor. While the training works well in a schoolhouse environment, it is impractical for a large number of students or when students are geographically dispersed. Thus, there was a need to make training more deployable, or more accessible, to individuals who are not stationed at the schoolhouse.

The Captains in Command training program was developed as an instructorless training program and modeled after the instructor-facilitated TLAC program in order to make the training more accessible. Captains in Command training makes use of the same deliberate practice and theme-based concepts used in TLAC training. However, in contrast to TLAC training, the Captains in Command program provides coaching and feedback to students using three-dimensional, animated characters who discuss the training from the perspective of an expert decision maker. In Captains in Command, those characters provide students with immediate performance evaluation and feedback on their performance.

Because our sample size was small, and because we made use of archival data to compare TLAC and Captains in Command training, our ability to generalize was clearly limited. Nonetheless there were no significant differences in the efficacy of the two training programs. Further, Captains in Command-trained students were able to identify significantly more information than untrained students with prior deployment experience. We find these results to be particularly exciting, given the different roles of the coaches in those programs. In TLAC, a skilled instructor was able to provide corrective feedback to an individual student in a group, classroom environment. In contrast, in Captains in Command an animated commander provides feedback on the *types* of behaviors expert commanders should exhibit, without providing feedback on the specific behaviors of the student. Yet the performance trends were still strikingly similar. This provides support for the types of topics discussed in the Captains in Command coaching discussions.

Our analyses demonstrated that Captains in Command is as effective at teaching students to identify critical information from a tactical scenario as the instructor-facilitated TLAC program. Additionally, Captains in Command-trained students performed better than previously deployed captains without specific adaptive thinking training. Captains in Command has the added advantage of standardizing content when a skilled instructor is not available. Captains in Command may also allow a greater number of vignettes to be completed in less time than the instructor-based training.

When used in the classroom with a skilled instructor, class discussions can be more dynamic and interactive than the instructorless training. Those discussions may lead to greater retention of ideas and concepts. Several students commented that the instructorless Captains in

Command could benefit from additional animation techniques to demonstrate important concepts and ideas rather than relying on animated coaching alone.

Based on the findings presented here, we recommend that both instructor-facilitated and instructorless Captains in Command training be implemented. Instructors should provide an introduction to the training and expert themes. They should also provide coaching and mentoring to students on the first two vignettes. Students should then complete a series of vignettes using the instructorless training before completing additional vignettes with the instructor. If an experienced instructor is not available, Captains in Command can clearly be used effectively on its own.

In order to train adaptive leaders, future development of Captains in Command should include vignettes from a wide range of areas of operation. It is possible that application of the themes may be dependent, at least partly, on the environment. That is, the use of a theme may be operationally defined by the specific environment. If we are to train leaders who are capable of responding across the full spectrum of operations in any operational environment, we must expose them to a wide range of scenarios across a large cross-section of potential warfighting environments. Similarly, the existing vignettes are focused on maneuver forces. Future development should develop training for the various warfighting functions. While many of the existing vignettes focus on the stability and reconstruction missions currently performed in Iraq and Afghanistan, they do not address the unique aspects of each individual branch function.

Conclusions

Experience implementing TLAC and Captains in Command training into course curriculum suggests that adaptive thinking training is feasible and can provide a valuable learning experience for students. As a research and development program, the training is not perfect. There will be a continued requirement to keep the training current and to develop vignettes for a wider variety of missions and areas of operation. In addition, there will be new interactive, multimedia instructional technologies that could be incorporated to further enhance the learning experience. However, the theme-based training method has been quantitatively shown to be an effective way to develop expert behaviors and to help Soldiers be better prepared to deal with unexpected situations under times of stress, because this methodology teaches Soldiers and leaders not "what to think" but "how to think." Rather than the "trial-by-fire" of crucible experiences described by Wong (2004), it is more appropriate to provide our junior leaders with the adaptive thinking skills they require prior to deployment.

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Appendix A

Captains in Command User Survey

Thank you for participating in the assessment of Captains in Command (CIC) training. In order to help the Army implement and support future fielding, please answer the questions below. For multiple choice questions please circle the response option that best reflects your opinion.

Branch: _____   Rank: _____   Years in Service: _____

Deployment Experience (locations & dates):
_____
_____
_____
_____
_____

Part 1. Overall CIC Assessment

For each of the following statements, indicate the degree to which you agree. Consider not only the vignettes completed as a part of the course, but also vignettes that could be developed for other operational environments (e.g., Iraq, Afghanistan, or other area).

5	4	3	2	1
Strongly Agree	Slightly Agree	Unsure	Slightly Disagree	Strongly Disagree

	5	4	3	2	1
1. Overall, CIC training is effective—it made me think.	5	4	3	2	1
2. I would recommend CIC to others.	5	4	3	2	1
3. I feel proficient in the use of the themes.	5	4	3	2	1
4. CIC would help my professional development.	5	4	3	2	1
5. CIC would help me be a better commander.	5	4	3	2	1
6. CIC was an engaging, interesting activity.	5	4	3	2	1
7. CIC helped me with other portions of the course.	5	4	3	2	1
8. CIC is an efficient way to provide instructorless coaching when live mentors are not available.	5	4	3	2	1
9. I would be interested in completing vignettes focused on other operational environments.	5	4	3	2	1

10. CIC would be effective training outside of a course   5   4   3   2   1
     (e.g., self-development).

11. What are the best or most effective parts of CIC training?

_____
_____
_____
_____
_____
_____
_____

12. What parts of CIC training need the most improvement?

_____
_____
_____
_____
_____
_____

Part 2. Usability Assessment

For each of the following statements, indicate the degree to which you agree.

5	4	3	2	1
Strongly Agree	Slightly Agree	Unsure	Slightly Disagree	Strongly Disagree

1. It was easy to navigate through the CIC program.   5   4   3   2   1

CIC presents tactical vignettes with three components. First CIC presents a tactical situation video clip. This is followed by an animated coaching video clip. Finally, a performance assessment checklist is provided for students to assess their skills. The following questions address these three components of CIC.

2. The tactical situation video clips provided an easily understandable tactical situation.

         5   4   3   2   1

3. The animated coaching video clips effectively reinforced the CIC themes.

         5   4   3   2   1

4. The performance assessment checklist effectively supported adaptive thinking training.

         5   4   3   2   1